

## ABSTRACT

### THREE-DIMENSIONAL ARRAY OF SUPPORTS FOR SOLID-PHASE PARALLEL SYNTHESIS AND METHOD OF USE

A three-dimensional (3D) array of solid-phase supports is adapted to provide  
5 parallel synthesis of a library of molecules with 3D diversity. Individual locations in the  
3D array may be assigned to selected molecules in the library such that molecules may be  
synthesized at and retrieved from such locations. Also, the supports include aperture  
walls in stacked plates; the supports may be suspended within stacked plate apertures; the  
3D array include discrete supports arranged in columns in one or more wells; the supports  
10 include tube inner walls or be suspended in tubes, the tubes being secured in stacked,  
two-dimensional (2D) frameworks; or the supports include beads contained in porous  
enclosures having non-porous side walls and being secured in stacked, 2D frameworks.  
A support transfer device enables transfer of solid-phase supports used in a 3D array.  
Such apparatus includes: a rack of rods sized to be inserted through supports and a  
15 mechanism to prevent supports from coming off the rack; tubes connected to a vacuum  
manifold to suction supports one Z plane at a time; or a transfer block having recesses to  
receive one or more support and at least one gate withholding supports from passing  
through the gate when in a closed position. A method of 3D synthesis includes: a)  
functionalizing solid-phase supports; b) placing supports in a 3D array; and c) performing  
20 parallel synthesis with 3D diversity. At least one unique R<sub>1</sub> group member may be  
assigned to each Z plane.